

ENERGY EFFICIENCY/RENEWABLE ENERGY IMPACT IN THE TEXAS EMISSIONS REDUCTION PLAN (TERP)

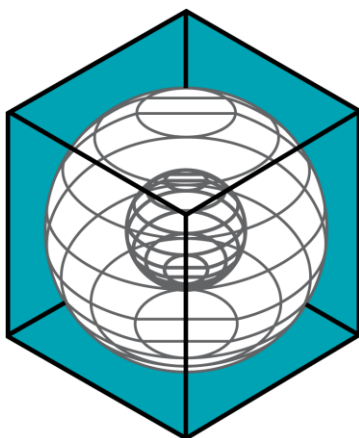
VOLUME III—TECHNICAL APPENDIX

**Annual Report to the
Texas Commission on Environmental Quality
January 2011-December 2011**



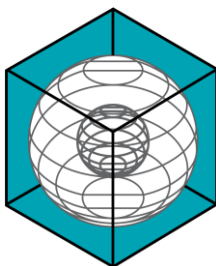
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December 2012



ENERGY SYSTEMS LABORATORY

**Texas Engineering Experiment Station
The Texas A&M University System**



ENERGY SYSTEMS LABORATORY

Texas Engineering Experiment Station
Texas A&M University System

3581 TAMU
College Station, Texas 77843-3581

December 31, 2012

Chairman Bryan W. Shaw
Texas Council on Environmental Quality
P. O. Box 13087
Austin, TX 78711-3087

Dear Chairman Shaw:

The Energy Systems Laboratory (Laboratory) at the Texas Engineering Experiment Station of the Texas A&M University System is pleased to provide its seventh annual report, "Energy Efficiency/Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP)," as required under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002 (Senate Bill 5, 77R as amended 78 R & 78S).

The Laboratory is required to annually report the energy savings from statewide adoption of the Texas Building Energy Performance Standards in Senate Bill 5 (SB 5), as amended, and the relative impact of proposed local energy code amendments in the Texas non-attainment and near-non-attainment counties as part of the Texas Emissions Reduction Plan (TERP).

Please contact me at (979) 845-1280 should you or any of the TCEQ staff have any questions concerning this report or any of the work presently being done to quantify emissions reduction from energy efficiency and renewable energy measures as a result of the TERP implementation.

Sincerely,

David E. Claridge, Ph.D., P.E.
Director

Enclosure

cc: Commissioner Toby Baker
Commissioner Carlos Rubinstein
Executive Director Zak Covar

Disclaimer

This report is provided by the Texas Engineering Experiment Station (TEES) as required under Section 388.003, (e) (2) (A) & (B) of the Texas Health and Safety Code and is distributed for purposes of public information. The information provided in this report is intended to be the best available information at the time of publication. TEES makes no claim or warranty, express or implied, that the report or data herein is necessarily error-free. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favoring by the Energy Systems Laboratory or any of its employees. The views and opinions of authors expressed herein do not necessarily state or reflect those of the Texas Engineering Experiment Station or the Energy Systems Laboratory.

VOLUME III – APPENDIX

Energy Efficiency/Renewable Energy Impact
In The Texas Emissions Reduction Plan

1 EXECUTIVE SUMMARY

The Energy Systems Laboratory (Laboratory), at the Texas Engineering Experiment Station of the Texas A&M University System, in fulfillment of its responsibilities under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002, submits its seventh annual report, Energy Efficiency/Renewable Energy (EE/RE) Impact in the Texas Emissions Reduction Plan to the Texas Commission on Environmental Quality.

The report is organized in three volumes:

- Volume I – Summary Report – provides an executive summary and overview;
- Volume II – Technical Report – provides a detailed report of activities, methodologies and findings;
- Volume III – Technical Appendix – contains detailed data from simulations for each of the counties included in the analysis.

Accomplishments:

1. Energy Code Amendments

The Laboratory was requested by several Council of Governments (COGs) and municipalities to analyze the stringency of several proposed residential and commercial energy code amendments, including: the 2003 and 2006 IECC and the ASHRAE Standards 90.1-2001 and 90.1-2004. Results of the analysis are included in the Vol II—Technical Report.

2. Technical Assistance

The Laboratory provided technical assistance to the TCEQ, PUCT, SECO, ERCOT, and several political subdivisions, as well as Stakeholders participating in improving the compliance of the Texas Building Energy Performance Standards (TBEPS). The Laboratory also worked closely with the TCEQ to refine the integrated NOx emissions reduction calculation procedures that provide the TCEQ with a standardized, creditable NOx emissions reduction from energy efficiency and renewable energy (EE/RE) programs, which are acceptable to the US EPA. These activities have improved the accuracy of the creditable NOx emissions reduction from EE/RE initiatives contained in the TERP and have assisted the TCEQ, local governments, and the building industry with effective, standardized implementation and reporting.

3. NOx Emissions Reduction

Under the TERP legislation, the Laboratory must determine the energy savings from energy code adoption and, when applicable, from more stringent local codes or above-code performance ratings, and must report these reductions annually to the TCEQ. Figure 1 shows the cumulative NOx emissions reduction through 2020 for the electricity and natural gas savings from the various EE/RE programs.

By 2011, the annual NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 80 tons-NOx/year (2.1% of the total NOx savings), savings from the PUC's Senate Bill 7 programs will be 340 tons-NOx/year (9.1%), savings from SECO's Senate Bill 5 program will be 162 tons-NOx/year (4.4%), electricity savings from green power purchases (wind) will be 3,062 tons-NOx/year (82.2%), and savings from residential air conditioner retrofits will be 72 tons-NOx/year (2.1%). The total annual NOx emissions reduction from all programs will be 3,723 tons-NOx/year.

In 2011, the OSD NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 0.34 tons-NOx/day (3.4%), savings from the PUC's Senate Bill 7 programs is 0.93 tons-NOx/day (9.4%), savings from SECO's Senate Bill 5 program is 0.44 tons-NOx/day (4.4%), electricity

savings from green power purchases (wind) are 7.63 tons-NOx/day (77.1%), and savings from residential air conditioner retrofits are 0.55 tons-NOx/day (5.6%). The total OSD NOx emissions reduction from all programs is 9.89 tons-NOx/day.

By 2013, the annual NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 150 tons-NOx/year (3.5% of the total NOx savings), savings from the PUC's Senate Bill 7 programs will be 547 tons-NOx/year (12.7%), savings from SECO's Senate Bill 5 program will be 277 tons-NOx/year (6.4%), electricity savings from green power purchases (wind) will be 3,250 tons-NOx/year (75.7%), and savings from residential air conditioner retrofits will be 72 tons-NOx/year (1.7%). The total annual NOx emissions reduction from all programs will be 4,296 tons-NOx/year.

By 2013, the OSD NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 0.62 tons-NOx/day (5.4%), savings from the PUC's Senate Bill 7 programs will be 1.50 tons-NOx/day (13.1%), savings from SECO's Senate Bill 5 program will be 0.76 tons-NOx/day (6.6%), electricity savings from green power purchases (wind) will be 8.10 tons-NOx/day (70.6%), and savings from residential air conditioner retrofits will be 0.50 tons-NOx/day (4.4%). The total OSD NOx emissions reduction from all programs will be 11.48 tons-NOx/day.

4. Technology Transfer

The Laboratory, along with the TCEQ, is host to the annual Clean Air Through Energy Efficiency (CATEE) conference, which is attended by top experts and policy makers in Texas and from around the country. At the conference the latest educational programs and technology is presented and discussed, including efforts by the Laboratory, and others, to reduce air pollution in Texas through energy efficiency and renewable energy. These efforts have produced significant success in bringing EE/RE closer to US EPA acceptance in the Texas SIP. The Laboratory will continue to provide superior technology to the State of Texas through such efforts with the TCEQ and the US EPA.

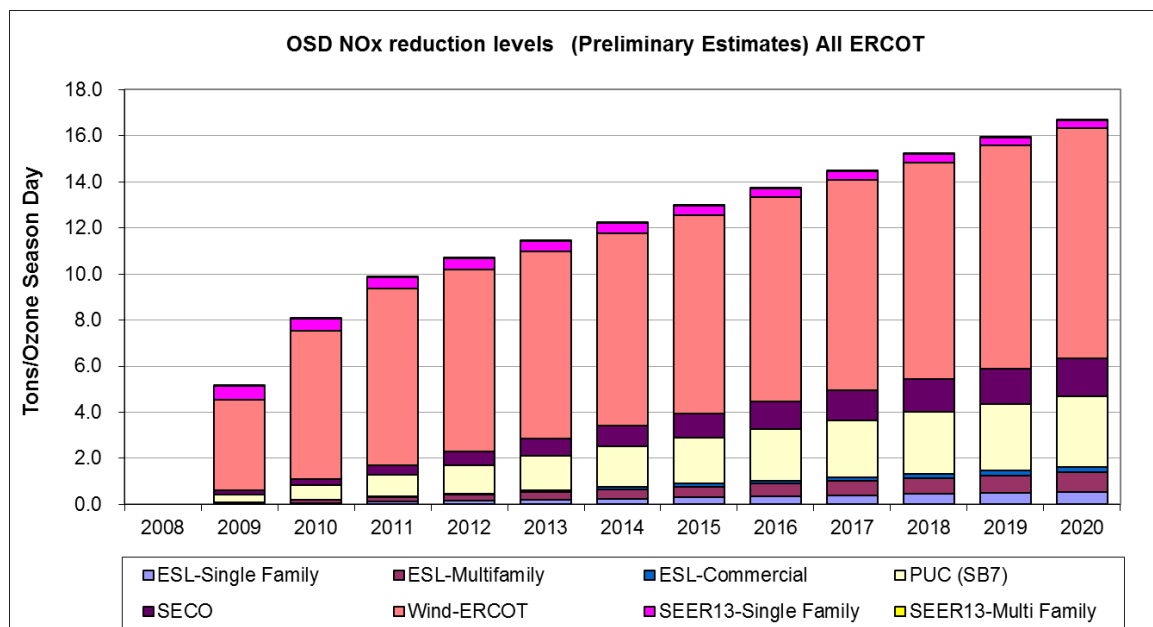


Figure 1: OSD NOx Emissions Reduction Projections through 2020 (Base Year 2008)

To accelerate the transfer of technology developed as part of the TERP, the Laboratory has also made presentations at national, state and local meetings and conferences, which includes the publication of peer-reviewed papers. The Laboratory will continue to provide technical assistance to the TCEQ, counties and

communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air quality for all Texans.

These efforts have been recognized nationally by the US EPA. In 2007, the Laboratory was awarded a National Center of Excellence on Displaced Emissions Reduction (CEDER) by the US EPA so that these accomplishments could be rapidly disseminated to other states for their use. The benefits of CEDER include: reducing the financial, technical, and administrative costs of determining the emissions reduction from EE/RE measures; continuing to accelerate implementation of EE/RE strategies as a viable clean air effort in Texas and other states; helping other states better identify and prioritize cost-effective clean air strategies from EE/RE; and communicating the results of quantification efforts through case-studies and a clearinghouse of information.

The Laboratory will continue to provide technical assistance to the TCEQ, counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air quality for all Texans.

If any questions arise, please contact us by phone at 979-862-2804, or by email at terpinfo@tees.tamus.edu.

ACKNOWLEDGEMENTS

This work has been completed as a fulfillment of the requirements in Texas Health Code, Senate Bill 5, Section 388.003, and through Senate Bill 20, House Bill 2481 and House Bill 2129, which requires the Laboratory to assist TCEQ in quantifying emissions reductions credits from energy efficiency and renewable energy programs, through a contract with the Texas Environmental Research Consortium (TERC). Similarly, selected Code training workshops were funded by the US DOE through the Texas State Energy Conservation Office (SECO). Partial funding on the Texas Climate Vision project, a joint project with the City of Austin was also provided by the US DOE through SECO.

The authors are also grateful for the timely input provided by the following individuals, and agencies: Mr. Art Diem, US EPA, for providing the eGRID database and Vincent Meiller and Robert Gifford, TCEQ.

Numerous additional individuals at the Laboratory contributed significantly to this report, including: Sung-Lok Do, Kee Han Kim, Stephen O'Neal, Rose Sauser and Ivonne Macouzet.

2 CODE AND PRE-CODE SIMULATION RESULTS BY COUNTY

This appendix to the Laboratory's 2011 Annual report contains the simulation results for single-family and multi-family residences in the 41 counties. For each county, code and pre-code simulation, and annual and peak-day results for individual residence are provided (Single-Family and Multi-Family).

For each county, pre-code and code simulation, and annual and peak day results, for 1999, 2000, 2002 and 2008 base year, for individual Single-family and Multi-family residences can be viewed using the links provided in Table 2. For counties other than 41 non-attainment and affected counties, simulations were performed for one representative county per climate zone. The annual and peak day savings for each county were calculated using the simulation results for the representative county for the same climate zone and number of houses.

Table 1: List of Counties

	County	Climate Zone
Affected County	Bastrop	4
	Bexar	4
	Caldwell	4
	Comal	4
	Ellis	5
	Gregg	6
	Guadalupe	4
	Harrison	6
	Hays	5
	Henderson	6
	Hood	5
	Hunt	5
	Johnson	5
	Kaufman	6
	Nueces	3
	Parker	6
	Rockwell	6
	Rusk	5
	San Patricio	3
	Smith	5
	Travis	5
	Upshur	6
	Victoria	3
	Williamson	5
	Wilson	4
Nonattainment County	Brazoria	3
	Chambers	4
	Collin	5
	Dallas	5
	Denton	6
	El Paso	6
	Fort Bend	4
	Galveston	3
	Hardin	4
	Harris	4
	Jefferson	4
	Liberty	4
	Montgomery	4
	Orange	4
	Tarrant	5
	Waller	4

Table 2: Simulation Results for Individual Single Family and Multi Family Residences for All Counties.

Non-attainment or Affected Counties	1999			2000			2002			2008		
BASTROP	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
BEXAR	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CALDWELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
COMAL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
ELLIS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
GREGG	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
GUADALUPE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HARRISON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HAYS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
JOHNSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
KAUFMAN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
NUECES	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
PARKER	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
ROCKWALL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
RUSK	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
SAN PATRICIO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
SMITH	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
TRAVIS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
UPSHUR	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
VICTORIA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WILLIAMSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WILSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
BRAZORIA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CHAMBERS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
COLLIN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
DALLAS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
DENTON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily

Non-attainment or Affected Counties	1999			2000			2002			2008		
EL PASO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
FORT BEND	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
GALVESTON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HARDIN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HARRIS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
JEFFERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
LIBERTY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
MONTGOMERY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
ORANGE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
TARRANT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WALLER	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HOOD	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HENDERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HUNT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000		2002		2008	
* COLEMAN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CALLAHAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
EASTLAND		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
ERATH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
FISHER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HASKELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
JACK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
JONES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MITCHELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
NOLAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
PALO PINTO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
SHACKELFORD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
STEPHENS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* TAYLOR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
THROCKMORTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
YOUNG		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* LEON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
* BELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BOSQUE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BROWN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
COMANCHE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
CORYELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
FALLS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
FREESTONE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HAMILTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HILL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
LAMPASAS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000		2002		2008		
	LIMESTONE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MCLENNAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MILLS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	NAVARRO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BRISCOE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	HALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	BASTROP		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CALDWELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	LEE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BLANCO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BURNET		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	GILLESPIE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	KERR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	REAL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	HAYS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	LLANO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MASON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	SAN SABA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	TRAVIS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WILLIAMSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	CHAMBERS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	BROOKS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CAMERON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	HIDALGO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	KENEDY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	STARR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WILLACY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999			2000			2002			2008		
	JIM HOGG	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	ZAPATA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	KLEBERG	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	ARANSAS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	NUECES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	DUVAL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	JIM WELLS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	LIVE OAK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	SAN PATRICIO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	DIMMIT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	LA SALLE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	MAVERICK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	MCMULLEN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	WEBB		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	ZAVALA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	HENDERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	SMITH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	DALLAS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	ELLIS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	HOOD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	JOHNSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	SOMERVELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	TARRANT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	LAMAR	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	RED RIVER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	TITUS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	COLLIN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000		2002		2008		
	DELTA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	DENTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	FRANKLIN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	HOPKINS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	KAUFMAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	PARKER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	RAINS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	ROCKWALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	VAN ZANDT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WISE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CULBERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	HUDSPETH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	ANDERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	ANGELINA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CHEROKEE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	HOUSTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	NACOGDOCHES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	RUSK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BRAZORIA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	GALVESTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	AUSTIN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	BRAZOS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BURLESON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	COLORADO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	FAYETTE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	FORT BEND		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	GRIMES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999			2000			2002			2008		
*	HARRIS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MADISON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	MONTGOMERY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	ROBERTSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	WALLER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	WASHINGTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	MILAM	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	BORDEN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	CHILDRESS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	CROSBY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	DAWSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	DICKENS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	KENT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	KING		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	MOTLEY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
*	SCURRY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	STONEWALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	CRANE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	REAGAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	UPTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	ANDREWS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	ECTOR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	GLASSCOCK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	HOWARD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	JEFF DAVIS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	LOVING		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
	MARTIN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			

ERCOT Counties (*Representative counties)		1999		2000		2002		2008		
	MIDLAND		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	REEVES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WARD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WINKLER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	ATASCOSA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	FRIO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	BEXAR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	COMAL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	GONZALES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	GUADALUPE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	KINNEY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	MEDINA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	UVALDE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	VAL VERDE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WILSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BANDERA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	KENDALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BREWSTER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	EDWARDS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	KIMBLE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	PECOS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	PRESIDIO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	SUTTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	TERRELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CONCHO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CROCKETT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	IRION		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000		2002		2008		
	MCCULLOCH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MENARD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	RUNNELS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	SCHLEICHER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	TOM GREEN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	COKE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	STERLING		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	COOKE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	FANNIN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	GRAYSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	HUNT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MONTAGUE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	ARCHER	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	BAYLOR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	CLAY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	COTTLE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	FOARD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	HARDEMAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	KNOX		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	WICHITA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WILBARGER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	BEE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
	CALHOUN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	GOLIAD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	JACKSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	MATAGORDA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	REFUGIO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999			2000			2002			2008		
*	VICTORIA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	WHARTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
	DE WITT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
*	KARNES	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
*	LAVACA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily